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AF & 3641

PTO/SB/21 (05-03)
Approved for use through 04/30/2003. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/803,418
Filing Date	March 9, 2001
First Named Inventor	Lawrence E. Conway
Art Unit	3641
Examiner Name	John A. Richardson
Attorney Docket Number	RDM 01-002

Total Number of Pages in This Submission

ENCLOSURES *(Check all that apply)*

- [x] Fee Transmittal Form
- [ ] Fee Attached
- [ ] Amendment/Reply
- [ ] After Final
- [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Response to Missing Parts/ Incomplete Application
- [ ] Response to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
- [ ] After Allowance communication to Group
- [x] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to Group **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please Identify below):

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Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Richard V. Westerhoff Eckert Seamans Cherin & Mellott, LLC
Signature	Richard V. Westerhoff
Date	October 29, 2003

CERTIFICATE OF TRANSMISSION/MAILING

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Typed or printed name	Janice Leah Jene'		
Signature	Janice Leah Jene'	Date	10/29/2003

PTO/SB/17 (10-02)
Approved for use through 10/31/2002. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

FEE TRANSMITTAL for FY 2003

Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 330.00

Complete if Known	
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METHOD OF PAYMENT *(check all that apply)*

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☑ Deposit Account:

Deposit Account Number: 02-2556

Deposit Account Name: Eckert Seamans

The Commissioner is authorized to: *(check all that apply)*

☑ Charge fee(s) indicated below ☑ Credit any overpayments

☑ Charge any additional fee(s) during the pendency of this application

☐ Charge fee(s) indicated below, **except for the filing fee** to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	740	2001	370	Utility filing fee	
1002	330	2002	165	Design filing fee	
1003	510	2003	255	Plant filing fee	
1004	740	2004	370	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

	Extra Claims		Fee from below	Fee Paid
Total Claims		-20** =		X =
Independent Claims		- 3** =		X =
Multiple Dependent				=

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	84	2201	42	Independent claims in excess of 3
1203	280	2203	140	Multiple dependent claim, if not paid
1204	84	2204	42	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

***or number previously paid, if greater; For Reissues, see above*

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	400	2252	200	Extension for reply within second month	
1253	920	2253	460	Extension for reply within third month	
1254	1,440	2254	720	Extension for reply within fourth month	
1255	1,960	2255	980	Extension for reply within fifth month	
1401	320	2401	160	Notice of Appeal	
1402	320	2402	160	Filing a brief in support of an appeal	330
1403	280	2403	140	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,280	2453	640	Petition to revive - unintentional	
1501	1,280	2501	640	Utility issue fee (or reissue)	
1502	460	2502	230	Design issue fee	
1503	620	2503	310	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(f)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	740	2809	370	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	740	2810	370	For each additional invention to be examined (37 CFR 1.129(b))	
1801	740	2801	370	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 330.00

SUBMITTED BY				(Complete *if applicable*)	
Name (Print/Type)	Richard V. Westerhoff	*Registration No. (Attorney/Agent)*	24,454	*Telephone*	412/566-6090
Signature				*Date*	October 29, 2003

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Group Art Unit 3641

Examiner: John A. Richardson

In re application of

LAWRENCE E. CONWAY ET AL.

Filed: March 9, 2001

Serial No.: 09/803,418

Entitled:

INTEGRAL PWR WITH DIVERSE EMERGENCY COOLING & METHOD OF OPERATING SAME

Attorney Docket No. RDM 01-002

October 29, 2003

Commissioner of Patents
MAIL STOP APPEAL BRIEF - PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

APPLICANTS' APPEAL BRIEF

1. The real party in interest.

The real party in interest is Westinghouse Electric Company, LLC a wholly-owned subsidiary of BNFL PLC.

2. Related appeals and interferences.

There are no related appeals or interferences known to Applicants.

3. Status of claims.

Non-elected claims 1-20 have been withdrawn. The remaining claims, 21-36, all stand rejected.

4. Status of amendments.

The only amendments to the claims were made by preliminary amendment to provide consistent terminology for claim elements and those amendments have been entered.

5. Summary of the invention.

The invention covered by the appealed claims is directed to a method of operating a pressurized water reactor (PWR) 1 employing an integrated reactor vessel 3 to provide diverse emergency cooling following a loss of coolant accident (LOCA). Integrated reactor pressure vessel 3 houses at least one, but in fact a plurality, of steam generators 9 together with the reactor core 5 in a single pressure vessel that is housed in a relatively small, high pressure containment structure 17.

While such an integrated reactor vessel 3 is known to eliminate the possibility of a large LOCA as the entire primary circuit is enclosed within the pressure vessel, the present invention makes use of a reactor safety system 27 that performs the functions of maintaining the reactor core/reactor pressure vessel water inventory, transferring reactor sensible heat and core decay heat to the environment, limiting containment peak pressure and reducing this pressure in the long term. This safety system 27 is greatly simplified as compared to existing safety system designs and provides independent and diverse methods of maintaining core cooling and containment integrity.

As one aspect of the invention, heat is removed from the pressure vessel 3 through the in-reactor pressure vessel heat transfer surface provided by the steam generators 9. Cooling fluid is circulated through the secondary circuit of the steam generators during a LOCA to withdraw heat from the reactor pressure vessel 3. The heat is extracted from the cooling water outside of the containment structure 17 in one or more heat exchangers 29 immersed in a pool of water 37 stored in the shield building 25. Heat is extracted at a rate which, within no more than about three hours, lowers pressure in the reactor pressure vessel 3 to a pressure

at or below the pressure in the containment structure 17 resulting from the LOCA to stop or reverse the mass flow of reactor coolant from the reactor pressure vessel 3, whereby the reactor core 5 remains covered without the addition of water from other sources.

As another aspect of the invention, in order to minimize the size of the containment structure 17 and yet limit peak contained pressure, one or more suppression tanks 45 containing a volume of water 47 are provided inside the containment structure 17. Steam, which escapes into and builds up pressure in the containment structure 17 during a LOCA, is directed into the water 47 in the suppression tank(s) 45, where it is condensed, by a pipe 49 having an upper end open to the interior of the containment structure 17 and a lower end equipped with a device such as a sparger 51 positioned below the surface of the water 47. Gas provided in the containment structure is also directed into the suppression tank(s) 45 with the steam through the pipe 49 by the higher pressure in the containment structure 17. This gas above the water 47 is compressed within the tank(s) 45. Rather than venting this compressed gas as in prior practice, pressure is maintained so that as the pressure within the containment structure 17 falls below the pressure of the compressed gas the portion of the water 47 of above the sparger 51 is transferred out of the pipe 49 and drains into a flood-up cavity 43 in which the reactor pressure vessel 3 is disposed. The suppression tank(s) 45 are mounted in the containment structure 17 at a level above the reactor core 5 so that this make-up water can be gravity fed to the reactor pressure vessel 3 if needed. The height of the sparger 51 in the suppression tank 45 is established so that only a first predetermined amount of water 47 above the sparger 51 is automatically passively transferred to the flood-up cavity 43, thereby always leaving a second amount of water below the sparger 51 for gravity fed make-up water, if necessary.

6. Issues.

Issue No. 1 – Did the Examiner err in rejecting Claims 30-36 under 35 U.S.C. § 102(b) as being anticipated by *Gardner, et al.* (U.S. 5,102,616).

Issue No. 2 – Did the Examiner err in rejecting Claims 21-29 under 35 U.S.C. § 103(a) as being unpatentable over *Gardner, et al.* in view of *Schulz* (U.S. 5,255,296), and in the case of Claim 28 in further view of *Sawabe* (U.S. 5, 278, 876).

7. Grouping of claims.

Group I – Claims 30 and 31 stand or fall together.

Group II – Claims 32, 34 and 35 stand or fall together.

Group III – Claim 33 stands or falls alone.

Group IV – Claim 36 stands or falls alone.

Group V – Claim 21 stands or falls alone.

Group VI – Claims 22 and 23 stand or fall together.

Group VII – Claim 24 stands or falls alone.

Group VIII – Claim 25 stands or falls alone.

Group IX – Claims 26 and 27 stand or fall together.

Group X – Claim 29 stands or falls alone.

Group XI – Claim 29 stands or falls alone.

8. Argument

Issue No. 1 - Did the Examiner err in rejecting Claims 30-36 under 35 U.S.C. § 102(b) as being anticipated by *Gardner et al.* (U.S. 5,102,616).

Claim 30 is directed, in pertinent part, to a method of operating a PWR having a containment structure containing an integral reactor that includes at least one steam generator mounted together with a reactor core in a pool of reactor coolant in a reactor pressure vessel. In response to a loss of coolant accident, the gas in the containment structure, together with

the steam in the containment structure resulting from the accident, is introduced into water in a suppression tank, also within the containment structure, to condense the steam. The water from the suppression tank is then selectively transferred to the reactor pressure vessel to keep the reactor core covered with water.

In rejecting Claims 30 to 36 being anticipated by *Gardner, et al.*, it is stated in paragraph 12 of the office action mailed on February 21, 2003, and relied upon by reference in the final rejection, that *Gardner, et al.* discloses "a means for introducing gas/steam mixture through valve 144 to the said containment structure. . . as depicted in for example, Figures 11 and 12. . . . "

Gardner et al. does not introduce steam from within the containment structure (containment building 122) into the water in a suppression tank (tank 134 of the reference) through the valve 144. In both embodiments of *Gardner et al.* shown in Figures 11 and 12, the valve 144 is used to quench steam taken directly from the pressure vessel 12 in the tank 134 through a pipe 142. The final rejection adds at paragraph 9 that *Gardner et al.* "clearly provides the means for introducing gas/steam resulting from the reactor coolant breaks inside the containment to the suppression tanks items 134 through the collecting vessel item 166 and plurality of pipes items 168, as depicted for example in Figures 11, 13." Thus, in addition to directly quenching steam from the reactor pressure vessel in the suppression tank 134, *Gardner et al.* provides a separate heat exchanger 160 in containment that condenses steam in containment, and the collecting vessel 166, which gathers the condensate and directs it into the tank 134 through the pipe 168. This is not what is called for in Claim 30. Instead, Claim 30 calls for "introducing the gas in the containment structure together with the steam in the containment structure resulting from the loss of coolant accident **into the water** in the at the least one suppression tank to condense the steam" (*emphasis added*). *Gardner et al.*, on the other hand quenches steam in the tank 134 taken directly through valve 144 from the pressure

vessel, and also condenses any steam in the containment structure and directs the condensate into the suppression tank through the collecting vessel 166. This dual operation of *Gardner et al.* is fundamentally different from the method called for in Claim 30. Applicants want to maintain pressure within the containment structure 17 to help limit boiling off of coolant in the pressure vessel to keep the core covered. *Gardner et al.* by condensing steam in containment lowers pressure in the pressure vessel causing more water covering the reactor core to boil off. By directly quenching steam from the reactor vessel in the tank 134, *Gardner et al.* further lowers pressure in the vessel permitting more to boil off. Applicants, on the other hand, want to maintain pressure in the containment structure to help limit boiling off of coolant in the pressure vessel to keep the core covered. However, in order to prevent pressure from getting too high in containment, the steam is forced by the pressure in the containment structure into the suppression tank where it is condensed. The amount of steam in containment that is so condensed is limited passively by the eventual equalization of pressure in the containment structure and the suppression tank.

In order for a patent to be invalid under 35 U.S.C. § 102(b), the invention, including all claim limitations, must be shown in a single prior art reference, *In re Spada*, 15 U.S.P.Q. 2d 1655, 1657 (Fed. Cir. 1990); *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1990), or be inherently described in a single prior art reference, *Minnesota Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics Inc.*, 24 U.S.P.Q. 2d 1321, 1332 (Fed. Cir. 1992); *Verdegall Bros. v. Union Oil Co.*, 2 U.S.P.Q. 2d 1051, 1053 (Fed. Cir. 1987). The *Gardner et al.* reference completely fails to teach introducing gas and steam in the containment structure resulting from a loss of coolant accident into the water in at least one suppression tank to condense the steam. Hence, Claim 30 is not anticipated by *Gardner et al.*

Claim 31 depends from Claim 30 and is therefore patentable over *Gardner et al.* for the same reasons.

Claim 32 is an independent claim directed, in pertinent part, to a method of operating a PWR that, in response to a loss of coolant accident, introduces gas in the containment structure together with steam in the containment structure resulting from a loss of coolant accident into the water in at least one suppression tank to condense the steam, and selectively transfers water from the suppression tank to a flood-up cavity 43 within the containment structure in which the lower portion of the reactor pressure vessel 3 containing the reactor core is disposed. Again, in Claim 32, it is the steam from within the containment structure that is condensed in the suppression tank, not steam taken directly from the pressure vessel or condensate taken from within the containment structure as taught by *Gardner et al.* Furthermore, *Gardner et al.* teaches transferring water from the tank 134 either directly, or through the tank 58, into the pressure vessel 12. It does not teach or suggest transferring water from the tank 134 into a flood-up cavity in which the reactor vessel is immersed. Though *Gardner et al.* discloses a chamber 130 around the lower end of the pressure vessel 12, this chamber is normally dry, but contains primary water coolant that might leak from the pressurized water reactor vessel so as to keep the pressure vessel 12 submerged in primary water coolant. See *Gardner et al.*, column 26, lines 50-56, describing Figure 11. In fact, water that spills into the chamber 130 is pumped by the pump 170 into the tank 134, where it can be transferred to the pressure vessel as described previously. Column 28, lines 7-40.

It is clear, therefore, that *Gardner et al.* discloses a method of operating a PWR that uses a different arrangement, which operates in a different way to achieve a different result. Therefore, Claim 32 is not anticipated by *Gardner et al.*

Claims 33-36 all depend from Claim 32 and are therefore patentable over *Gardner et al.* for the same reasons. Furthermore, Claim 33 calls for using gas compressed during condensing of steam in the at least one suppression tank to transfer the water in the suppression tank to the flood-up cavity. Again, *Gardner et al.* does not transfer water from

the suppression tank to a flood-up cavity. Also, *Gardner et al.* condenses steam outside the suppression tank and the condensed water just flows by gravity into the tank and does not compress any gas in the tank, which has an open top and therefore cannot compress gas.

In addition, Claim 36 calls for introducing gas and steam into the water in the at least one suppression tank at a level to transfer a selected amount of the water in the suppression tank to the flood-up cavity using compressed gas and leaving the remaining amount of water for transfer to the pressure vessel by gravity. *Gardner et al.* does not suggest transferring any water to the flood-up cavity, let alone using the pressure of gas compressed in the suppression tank, and hence, in no way suggests the novel method of selecting the height of the steam and gas injection into the water in the suppression tank to passively establish the fraction of water directed to the flood-up cavity with the remainder being available for the pressure vessel, if needed. Accordingly, Claim 36 further patentably distinguishes over *Gardner et al.*

Issue No. 2 - Did the Examiner err in rejecting Claims 21-29 under 35 U.S.C. § 103(a) as being unpatentable over *Gardner, et al.* in view of *Schultz* (U.S. 5,255,296), and in the case of Claim 28 in further view of *Sawabe* (U.S. 5,278,876)

Claim 21 is directed, in pertinent part, to a method of operating a PWR having a containment structure containing an integral reactor comprising at least one steam generator mounted together with the reactor core in a pool of reactor coolant in a reactor pressure vessel wherein the steam generator has a secondary loop extending outside of the containment structure. The method comprises, in response to a loss of coolant accident, circulating cooling fluid through the secondary circuit of the steam generator to withdraw heat from the reactor pressure vessel and extracting the heat from the cooling water outside of the containment structure at a rate which, within no more than about three hours, lowers pressure in the reactor pressure vessel to a pressure at or below pressure in the containment structure resulting from the loss of coolant accident, thereby stopping or reversing the mass flow of

reactor core from the reactor pressure vessel so that the reactor core remains covered without the addition of water from other sources.

While *Gardner et al.* shows a steam generator within the pressure vessel, it in no way teaches or suggests using the secondary side of the steam generator during a loss of coolant accident to reverse the mass flow out of the vessel. Instead, *Gardner et al.* relies upon the injection of water into the pressure vessel, as described above, in order to keep the core covered, and therefore, from overheating. It also uses an additional heat exchanger 160 inside of containment to condense steam for return of the condensate to the pressure vessel. It even uses another heat exchanger 148 outside of containment which cools the water in the tank 134 and the tank 58, but it does not teach or suggest the use of the secondary side of the steam generator during a loss of coolant accident to lower the pressure in the pressure vessel to or below that in the containment structure, to thereby reverse the mass flow out of the pressure vessel as called for in Claim 21.

It was asserted in the Office Action that *Gardner et al.* discloses the claimed invention except for the specific time period of about three hours, but that this time period would have been obvious since where "the general conditions of the claim are disclosed in the prior art, see for example, the secondary reference Schulz [sic] (Column II, lines 18-35, stating several hours), discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPTO [sic USPQ] 233."

First, *Schulz*, which is directed to a gutter system for collecting condensate inside a containment structure merely mentions that "[i]n the event of a nuclear accident, the water in even a large heat sink tank may heat to boiling in several hours". This quotation from the "Background of the Invention" section of *Schulz* refers to the boiling of water in a heat sink tank, which is distinct from the reactor pressure vessel, and is, therefore, totally irrelevant to the issue at hand.

Secondly, it is important to note that the citation from *In re Aller* relied upon by the Examiner requires that the general conditions of a claim must be disclosed in the prior art before it can be held that discovering an optimal or workable ranges only involves routine skill in the art. 105 U.S.P.Q. at 235. In the case of Claim 21, as discussed above, *Gardner et al.* does not disclose the claimed invention except for citing a specific time period for heat removal, primarily because it does not teach or suggest using the secondary circuit of the at least one steam generator to extract heat outside of the containment structure during a LOCA. Hence, the predicate for asserting that discovering the optimal or workable ranges involves only routine skill in the art is not present. Furthermore, the secondary reference *Schulz* is directed to a different process, a time period for water in a heat sink to boil off rather than the time required to lower the pressure within a reactor pressure vessel during a LOCA to reverse the mass flow out of the vessel.

The final rejection while ignoring the fact that none of the cited references, whether taken singularly or in combination, disclose the general conditions of Claim 21 as required by *In re Aller*, asserts that *Gardner et al.* provides numerous citations "to qualitative time periods of operation." None of these "time periods" remotely suggest the time period for stopping or reversing mass flow from the reactor pressure vessel during a loss of coolant accident. More specifically, column 15, lines 46-51, relates to ensuring that mass and energy transfers between a pressurizer and a vapor lock are "not so rapid". Column 17, lines 28-33, refers to a system that "provides a rapid source of make-up water". Column 19, lines 25-27, refers to "rapid heat transfer". Column 19, lines 48+, does not refer to any time periods nor does the reference to column 26, lines 18-29. Column 27, lines 64+, refers to something "eventually" occurring as does the reference to column 28, lines 19-40, the latter of which also refers to coolant being "available immediately". The only temporal references at column 30, lines 39-43, are "as the plant cools down" and at lines 66+, "ultimately". These vague

intimations of time, none of which mentions the reduction of pressure in the pressure vessel to or below pressure in the containment structure, are not relevant because the initial requirement of *In re Aller*, that the prior art must disclose the general conditions before it can be held that discovering optimum or workable conditions only involves routine skill, has not been met.

The final rejection also asserts that Applicants are relying upon features not recited in the rejected claims for patentability, *i.e.*, heat exchangers immersed in a pool of water, and heat exchangers stored in a shield building. Applicants are not relying on those specific detailed features for patentability. They were mentioned in the Response of May 21, 2003 to point out in the specification specific elements in the disclosed embodiment to explain where the elements of the claims were located. The essential point is that neither reference teaches or suggests extracting heat from cooling water in the secondary circuit outside of the containment structure at a rate which, within no more than about three hours, lowers the pressure in the reactor pressure vessel to a pressure at or below the pressure in the containment structure so that even in combination, *Gardner et al.* and *Schulz* do not suggest the method of Claim 21. Accordingly, Claim 21 is patentable over the cited references.

Claims 22-26 and 29 depend from Claim 21 and are therefore patentable over the references for the same reasons.

Furthermore, Claim 22 adds to Claim 21 that the containment structure includes at least one suppression tank containing water, introducing steam in the containment structure resulting from the loss of coolant accident into the water in the suppression tank to condense the steam, and selectively transferring the water in the suppression tank to the reactor pressure vessel. This claim distinguishes over *Gardner et al.* for the same reasons discussed in connection with Claim 30. *Schulz* adds nothing to the teachings of *Gardner et al.* that would render Claim 22 unpatentable as it does not suggest introducing steam in the

containment structure into a suppression tank. Hence, Claim 22 further patentably distinguishes over the references.

Claim 24 calls for using gas in the suppression tank above the water in the tank which is compressed by the addition of a gas mixture from the pressurized containment structure to transfer at least some water in the tank to the flood-up cavity. As discussed in connection with Claim 30, neither of the references teaches using gas compressed in the suppression tank to transfer water to a flood-up cavity. Therefore, Claim 24 further patentably distinguishes over the references.

Claim 25 adds features similar to that of Claim 36 and is therefore patentable over *Gardner et al.* for the same reasons and *Schulz* adds nothing to *Gardner et al.* to suggest the claimed method of selecting a level for introducing gas/steam into the tank at a level to determine the portion of water provided to a flood-up cavity leaving the remaining water in the tank for selective transfer to the pressure vessel. Accordingly, Claim 25 further distinguishes over *Gardner et al.* and *Schulz.*

Claim 26 adds to Claim 21 introducing steam and gas in a containment structure into a suppression tank to condense the steam and selectively using the gas in the suppression tank compressed during condensing of the steam to transfer water to the flood-up cavity. Clearly, from the above discussion, this claim patentably distinguishes over *Gardner et al.* and *Schulz.*

Claim 29 adds to Claim 21: disposing the lower end of the reactor pressure vessel in a flow-up cavity in the containment structure; providing a supply of water in the containment structure to fill the flood-up cavity to a level above the reactor core; and selectively transferring water from the flood-up cavity to the reactor pressure vessel above the reactor core by gravity.

Neither of the references *Gardner, et al.*, nor *Schulz*, whether taken singly or in combination, teach or suggest, providing a supply of water in a containment structure to fill

the flood-up cavity to a level above the top of the reactor core and selectively transferring water from the flood-up cavity to the reactor pressure vessel above the reactor core by gravity. As discussed above in connection with Claim 32 *Gardner, et al.* does teach collecting spilt water in the chamber 130 and pumping it up to the tank 134. This water is then available for gravity feed to the pressure vessel; however, it is not a passive system as it requires pumping. Claim 29, on the other hand calls for selectively transferring water from the flood-up cavity to the reactor pressure vessel above the reactor core by gravity. As neither of the references suggests this method, it is patentably distinct over *Gardner, et al.* and *Schulz*.

Claim 28 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Gardner et al.* in view of *Schulz* and in further view of *Sawabe* (US 5,278,876).

Claim 28 depends from Claim 21 and is therefore patentable for the same reasons. Furthermore, Claim 28 calls for selectively venting steam from an upper portion of the reactor pressure vessel into the containment structure to ensure equalization of reactor pressure vessel pressure and containment structure pressure at a rate such that following a break in a lower portion of the reactor pressure vessel, the reactor pressure vessel water level does not fall below the top of the reactor core. *Sawabe* was cited as showing that it is well known to provide reactor pressure vessel head venting. It was concluded by the Examiner that therefore it would have been obvious to incorporate such a vessel head venting means as shown in *Sawabe* in order to release "non-condensable gases" resulting from abnormal/accident conditions of operation". *Sawabe* states at column 1, lines 30-33, that such vent lines are used "for releasing or venting non-condensable gases such as nitrogen before start-up of the reactor core, for example" (emphasis added). *Sawabe* also states at column 5, lines 31-35, that "[a]lthough the vent line 30 is preferably used for venting the fluid 60 from within the dome 36, it could also be used in alternate embodiments providing a

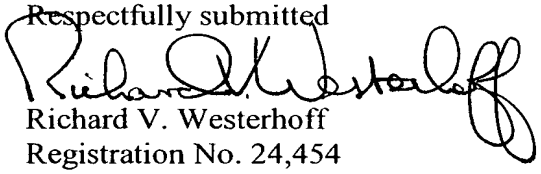
passage for channeling a fluid such as water for example into the pressure vessel 12 if desired."

Claim 28 is directed to a method of venting steam, a condensable gas, from the pressure vessel upon the occurrence of a break in a lower portion of the pressure vessel to equalize pressure in the pressure vessel and containment structure at a rate such that the vessel water level does not fall below the top of the reactor core. The mere suggestion by *Sawabe* of a particular structure for a vent does not by any means teach the claimed procedure and there is nothing in *Gardner et al.* or *Schulz* when taken together with the teachings of *Sawabe* to suggest the method called for in Claim 28. Accordingly, Claim 28 further patentably distinguishes over any combination of the references as applied.

9. Conclusions.

The rejections of Claims 30-36 under 35 U.S.C. § 102(b) and of Claims 21-29 under 35 U.S.C. § 103(a) should be reversed.

Respectfully submitted



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